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AGRICULTURAL MEMORANDUM 543

DR M HOUGH

Weather Factors Affecting Rape Cultivation in Britain - Revised Version.

The cultivation of rape for oil is now economically more attractive than in previous years. Only a small acreage of oil seed rape has so far been cultivated in Britain (17,000 acres in 1972) and this note is an attempt to summarise the weather factors which could be important for the crop.

Nearly all counties in England and Wales grow a few acres of oil seed rape, but by far the largest concentration is in central southern England and the south east Midlands from Hampshire to Northamtonshire. This pattern seems to have arisen out of the need for a break crop in areas of continuous cereal growing. A processing plant in Hampshire helped the production in that area.

Rape Plants

Rape is a member of the brassicae and two commercial types are grown:

a. Winter Rape (Brassica napus var. oleifera subvar. biennis)

This is sown in August/September and plants enter the winter as a rosette of leaves. The size of the plants varies with sowing date and growing conditions after sowing. There appears to be a cold requirement before reproductive growth is possible and flowers can be initiated between November and February depending on whether the sowing was early (August), or late (October). As spring advances the plants bolt and flowering occurs in April and May, during which time their height increases from 3 to 5 feet. The pods grow during May and June and by early July they are ready to harvest.

b. Spring Rape (Brassica napus var. oleifera subvar. annua)

Spring crops are sown in March/April and germination and emergence proceeds when the soil temperature at seed depth rises above about 5°C. Stem extension occurs as the season advances and the flowers subsequently open in June. Pods grow in July and the crop is harvested in late August and September.

Spring sown plants are usually smaller and less branched than autumn crops, and the yields are lower. The oil content of the seed is also less: 38-42% for Spring rape, 42-48% for Winter rape.

Turnip rape (Brassica campestris) is no longer grown in UK, but is popular in marginal areas of Europe with short growing seasons, where rape has less chance of surviving the winter.

Weather Factors and Winter Rape

Seedbed Preparation

Winter rape would usually follow a crop of barley harvested in August (spring barley) or July (winter barley). This crop will have removed the available water in the top soil layer. In this case preparation of the soil to make a sufficiently fine seedbed may require some rainfall, and seed germination would require further rain.

One possible way to assess the climatic risks here is to do a water balance so as to estimate the date when the top 10cm of soil is back to field capacity, and then to estimate the number of workdays available for preparation and sowing in the remaining part of September.

Overwintering

Research in Sweden has shown that damage to rape occurs when the plant temperature falls below about -12°C, while plant temperatures below -18°C are lethal. A deep snow cover gives good protection against frost. Such cold weather is rare in Britain, but winter weather such as that experienced in 1947 and 1963 would cause some plant losses. In these two winters the coldest part of Britain was the east Midlands from Norfolk and Suffolk westwards to Northamptonshire. In 1963 Shropshire and Gloucester were as cold as the Midlands. Small or tender plants are more susceptible to cold than others. Small plants are normally produced by late sowings and tender growth could be due to excessive nitrogen in the seedbed. When stem extension occurs, narrow row widths can give leggy plants which are susceptible to frost damage. Cold weather in late Winter or early Spring is more important than at other times. Small plants are also susceptible to frost heaving when cold weather follows rain. Plants which have been damaged by frost are also more susceptible to infection by fungi.

Waterlogging is detrimental at any time, but is more likely to occur in late winter and early spring.

Spring Frost

There is some evidence that air temperatures of -2 to -3°C which occur when the flowers are just opening can damage then and reduce yields. 1972 could have been serious for rape in this respect since warm sunny weather in March brought on the flowers and was followed by frost in April. Frost damage to early sown rape could be reduced by avoiding valley bottoms.

Harvest

Dry, sunny weather during the last stage of pod maturation makes for an easy harvest. A popular method is to windrow the crop after it has been cut so as to dry it in the field, and to permit the ripening of later formed pods. Rain, followed by humid weather would be unfavourable at this stage and may cause yield losses due to premature germination in the swath.

Weather Factors and Spring Rape

Sowing

Similar problems are encountered when sowing rape or spring cereals. A dry spell is needed for successful sowing and it must be expected that wet springs will force the sowing well into April. Later sowings usually reduce the yields.

Pod Growth

Moisture stress during this stage is likely to reduce pod growth and yield. Spring sown crops would be more subject to this than autumn sowings since the pods develop later in the summer. Controlled environment work (Canvin 1965) has shown that the oil content of the seed decreases as the temperature rises, with the decrease most marked between 21 and 26°C. This may possibly be involved in the reason why Spring sown crops give lower yields than Autumn crops.

Harvest

Spring rape can either be combined directly or windrowed. The harvest would be hampered by wet weather particularly if the crop was late in maturing due to delayed sowing or a poor summer growing season. The rape harvest coincides with the main cereal harvest and usually the rape is left until the last. The climatic risks could be assessed by the number of available work days in September suitable for harvesting operations.

Fertiliser

Autumn sown crops are given NPK in the seedbed. A further N application in February/March helps the plants through the rest of the season. Excess winter rain may be important for determining the spring nitrogen application. Spring sown crops receive fertiliser in the seedbed, but further applications may be necessary if April is very wet.

Pests and Diseases

Pollen beetle and seed weevils attack the crop, and diseases such as mildew also occur. Late spring sown crops are more prone to disease than earlier sowings and if a spring sown crop is grown close to a winter crop there is the danger of carry over of disease from one crop to the other. Weather is involved here due to its action on the life cycle of the organisms.

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